

## Italy's Multi-Purpose Logistics Modules serve as station's 'moving vans'

**B**uilt by the Italian Space Agency (ASI), the Leonardo Multi-Purpose Logistics Module is the first of three such pressurized modules that will serve as the International Space Station's "moving vans," carrying laboratory racks filled with equipment, experiments and supplies to and from the station aboard the space shuttle.

The unpowered, reusable logistics modules function as both a cargo carrier and a space station module when they are flown. Mounted in the space shuttle's cargo bay for launch and landing, they are berthed to the station using the shuttle's robotic arm after the shuttle has docked. While berthed to the station, racks of equipment and supplies are unloaded from the module and then old racks and equipment may be reloaded to be taken back to Earth. The logistics module is then detached from the station and positioned back into the shuttle's cargo bay for the trip back to Earth. When in the cargo bay, the cargo module is independent of the shuttle cabin, and there is no passageway for shuttle crewmembers to travel from the shuttle cabin to the module.

To function as an attached station module and as a cargo transport, the logistics modules also include components that provide some life support, fire detection and suppression, electrical distribution and computer functions. Eventually, the modules also will carry refrigerator freezers for transporting experiment samples and food to and from the station. Although built in Italy, the logistics modules, technically known as Multi-Purpose Logistics Modules or MPLMs, are owned by the U.S. and provided in exchange for Italian access to U.S. research time on the station.

For STS-102, Leonardo will be filled with equipment and supplies to outfit the U.S. Laboratory Destiny, which was carried to the station during STS-98.

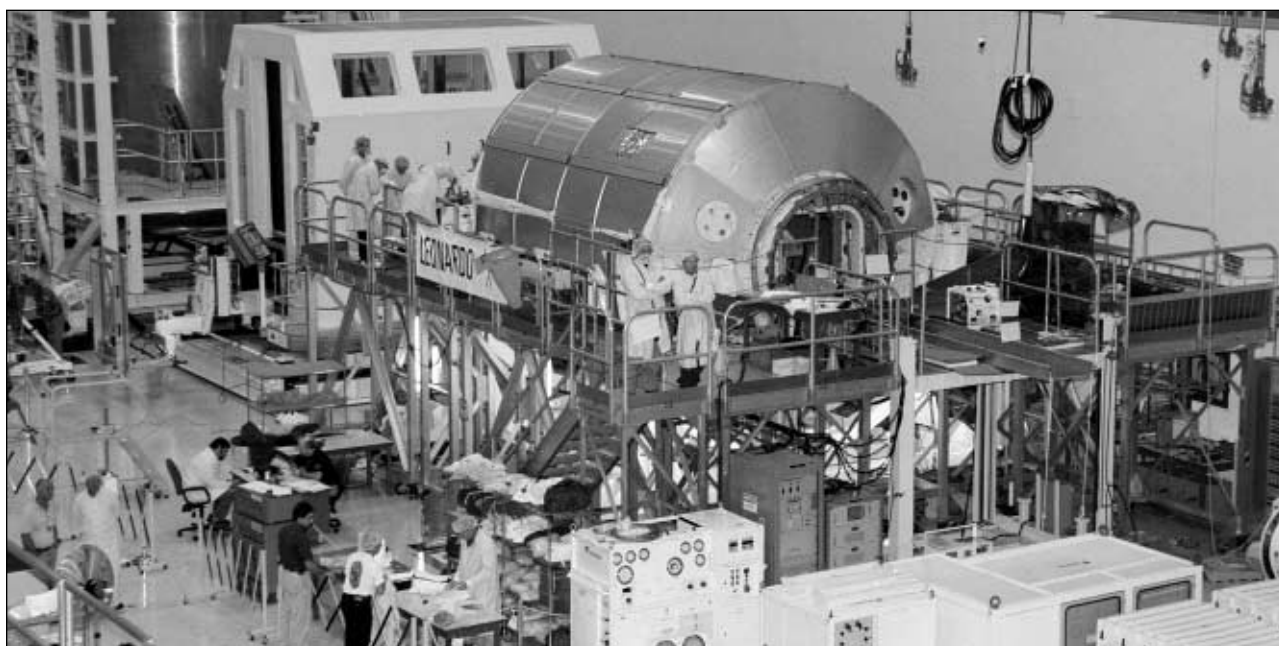
Construction of ASI's Leonardo module began in April 1996 at the Alenia Spazio factory in Turin, Italy. Leonardo was delivered to Kennedy Space Center from Italy in August 1998 by a special Beluga cargo aircraft. The cylindrical module is about 21 feet long and 15 feet in diameter, weighing almost 4.1 metric tons. It can carry up to 9.1 metric tons of cargo packed into 16 standard space

station equipment racks. Of the 16 racks the module can carry, five can be furnished with power, data and fluid to support a refrigerator freezer.

The names of the other two MPLMs are Raffaello and Donatello. The Italian Space Agency chose the names of the modules because they denote some of the great talents in Italian history. Leonardo da Vinci, an extraordinary inventor-scientist, civil engineer, architect, artist, and military planner and weapons designer; Donato de Betto di Bardi Donatello, Florentine sculptor and one of the founders of modern sculpture; and

Raffaello Sanzio, an artist whose work stands alone for its visual achievement of human grandeur.

"Alenia Spazio completed the construction of Raffaello in summer 1999 and delivered it to KSC on August 13, while Donatello was delivered to KSC on Feb. 1 this year," said Dr. Saverio Lioy who served as the Alenia infrastructure manager during the MPLM development. "The partnership between NASA and ASI and respective prime contractors Boeing and Alenia Spazio was excellent and provided a solid background for the continuation on the other programs presently ongoing like Nodes 2 and 3, the Automated Transfer Vehicle and the Cupola." ■



Workers in the Space Station Processing Facility work on Leonardo, the Multi-Purpose Logistics Module.

### James Voss Expedition Two Flight Engineer

NASA Astronaut James Voss (Colonel, USA, Ret.) was born on March 3, 1949, in Cordova, Alabama, but considers Opelika, Alabama, to be his hometown. He received a bachelor of science degree in aerospace engineering from Auburn University in 1972, and a master of science degree in aerospace engineering sciences from the University of Colorado in 1974. Voss has been working at JSC since November 1984. Selected as an astronaut candidate by NASA in June 1987, Voss completed a one-year training and evaluation program in August 1988, which qualified him for assignment as a mission specialist on space shuttle flights. He has worked as a flight crew representative in the area of shuttle safety, as a CAPCOM, providing a communications interface between ground controllers and flight crews during simulations and shuttle flights, and as the Astronaut Office training officer. A veteran of four space flights, Voss has logged over 600 hours in space. He flew as a mission specialist on STS-44 in 1991 and STS-53 in 1992, and was the payload commander on STS-69 in 1995. He last flew as a mission specialist on STS-101 in 2000. His honors include the NASA Outstanding Leadership Award (1996), NASA Exceptional Service Medal (1994), and four NASA Space Flight Medals.

### Yury Usachev Expedition Two Commander

Expedition Two Commander Yury Usachev was born on Oct. 9, 1957, in Donetsk, Rostov, on Don Region, Russia. He graduated from Moscow Aviation Institute with an engineering diploma in 1985. Upon graduation, he went to work for Energia, participating in groups working with EVA training, future construction in space, public relations, and ergonomics. In 1989, he was appointed to the position of cosmonaut candidate at the Cosmonaut Training. From 1989 to 1992, he underwent a course of general space training. He was a member of the back-up crew for the Mir-13, 14, and 19 missions. From Jan. 8, 1994, to July 9, 1994, he served as board engineer on Space Station Mir. From Feb. 21 to Sept. 2, 1996, he again served as board engineer Mir-21. One month later, he and Yuri Onufrienko were joined by Shannon Lucid. Most recently, he served on the crew of STS-101, the third shuttle mission devoted to International Space Station construction. Altogether, he has logged more than 385 days in space and has participated in six space walks. He was awarded both the Hero of the Russian Federation and the Pilot/Cosmonaut medals after his first space flight in 1994. After his second flight, in 1996, he was awarded the Order of Service to the Country, Level III. He was also named a

Chevalier in the French Honor Legion. NASA has awarded him the NASA Medal for Public Service and a NASA Space Flight Medal.

### Susan Helms Expedition Two Flight Engineer

NASA Astronaut Susan J. Helms (Colonel, USAF) was born on Feb. 26, 1958, in Charlotte, North Carolina, but considers Portland, Oregon, to be her hometown. Helms graduated from the U.S. Air Force Academy in 1980 with a bachelor of science degree in aeronautical engineering. She received her commission and was assigned to Eglin Air Force Base, Florida, as an F-16 weapons separation engineer with the Air Force Armament Laboratory. In 1982, she became the lead engineer for F-15 weapons separation. She received a master of science degree in aeronautics/astronautics degree from Stanford University in 1985. In 1987, she attended the Air Force Test Pilot School at Edwards Air Force Base, Calif. After completing one year of training as a flight test engineer, Helms was assigned as a USAF exchange officer to the Aerospace Engineering Test Establishment, Canadian Forces Base, Cold Lake, Alberta, Canada, where she worked as a flight test engineer and project officer on the CF-18 aircraft. Selected by NASA in January 1990, Helms became an astronaut in July 1991. A veteran of four space flights, Helms has logged over 1,096 hours in space. She is the recipient of the Distinguished Superior Service Medal, the Defense Meritorious Service Medal, the

Air Force Meritorious Service Medal, the Air Force Commendation Medal, four NASA Space Flight Medals, and the NASA Outstanding Leadership Medal.

# Expedition 2 Crew

